B&Q Cricklewood
ES Volume I

Chapter 10: Climate Change

Montreaux Cricklewood Developments Ltd

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10. Climate Change

10.1 Introduction

10.1.1 This chapter of the Environmental Statement (ES) reports the findings of an assessment of the likely significant effects on Climate Change as a result of the proposed 'B&Q Cricklewood' development (hereafter referred to as the 'Proposed Development') in the London Borough of Barnet (LBB).

10.1.2 To align with the requirements of the EIA Regulations, a Climate Change Assessment considers three separate aspects:

- **Greenhouse gas (GHG) emissions** – an assessment of the effects on the climate from GHG emissions arising from the Proposed Development, including how the project will affect the ability of the Government to meet its carbon reduction plan targets;
- **Climate change resilience (CCR)** – a review of the resilience of the Proposed Development to climate change, including how the Proposed Development's design will take account of the projected impacts of climate change; and
- **In-combination climate change impacts (ICCI)** – considering the combined impact of the Proposed Development and potential climate change on the receiving environment.

10.1.3 An ICCI assessment was scoped out of this Climate Change assessment on the basis that any identified in-combination climate change impacts will be addressed in other relevant planning documents, including the Drainage Strategy[1], Flood Risk Assessment[2], and *Chapter 16: Wind Microclimate*.

10.1.4 A statement which provides a review of the CCR of the Proposed Development has been prepared and included within *ES Volume III: Appendix 10-1*. The statement sets out the historic climate conditions and future climate projections and includes a review of measures designed to improve the resilience of the Proposed Development.

10.1.5 The potential for effect interactions on a single receptor (Type 1 effects) are discussed in *Chapter 17: Effect Interactions*.

10.1.6 This assessment and ES chapter has been produced by AECOM Infrastructure and Environment Ltd.

10.2 Legislation and Planning Policy Context

National Legislation

Climate Change Act 2008 (2050 Target Amendment) Order 2019[3]

10.2.1 Climate Change Act 2008 (2050 Target Amendment) Order 2019 sets a legally binding target for the UK to achieve net zero carbon emissions by 2050 from 1990 levels. The target is supported by a series of five-year 'carbon budgets' with progress being monitored by the Committee on Climate Change, an independent advisor to the UK Government.

Carbon Budgets Order 2009[4]

10.2.2 The Carbon budgets set a legally-binding restriction on the total amount of greenhouse gases the UK can emit per each five-year budgetary period. The carbon budgetary periods applicable to the Demolition and Construction phase (see *Chapter 6: Demolition and Construction*) of the Proposed Development are the 3rd and 4th (2018-2027), with the 4th and 5th carbon budgets applicable in the Complete and

[1] AECOM, 2020; B&Q Cricklewood Drainage Strategy. Refer to Chapter 4, Existing Drainage; and Chapter 5, Proposed Surface Water Drainage.
[2] AECOM, 2020; B&Q Cricklewood Flood Risk Assessment. Refer to Chapter 3 section 3.3, Climate change; Chapter 4, Flood Risk; and Chapter 5, Residual Flood Risk
[3] HM Government, 2019; The Climate Change Act 2008 (2050 Target Amendment) Order 2019
[4] HM Government, 2009; Carbon Budgets Order 2009

Operational Phase. Carbon budgets have not yet been developed for post 2032. The contribution of the GHG emissions from the Proposed Development towards the carbon budget limits are assessed in Section 10.6.

National Planning Policy

National Planning Policy Framework (NPPF) (2019)[5]

10.2.3 Within the NPPF, Paragraphs 8, 20 and 149 address requirements for adaptation, mitigation and climate change resilience; Paragraphs 148 and 157 address requirements for flood risk and damage to property and people; Paragraphs 150 and 153 address requirements for reduction of CO_2 emissions through design and reduced energy consumption; and Paragraphs 155 to 165 address requirements for the use of climate projections and the associated flood risk and adaptation.

National Planning Practice Guidance (NPPG) (2019)[6]

10.2.4 Particularly Paragraphs 149 and 150 in relation to climate change adaptation and resilience, as well as climate change mitigation through reducing GHG emissions; and Paragraph 157 in relation to adapting to the current and future impacts of climate change, particularly flood risk.

Regional Planning Policy

The London Plan – Spatial Development Strategy for Greater London (2016)[7]

10.2.5 Chapter 5 of the London Plan outlines policies to underpin London's response to climate change, covering mitigation and adaptation strategies. It describes the early planning stages as the most effective times to incorporate relevant design and technological measures to ensure the full carbon reduction and climate change adaptation potential is realised.

10.2.6 The Plan seeks "*…to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025*" and aims to reduce the impacts of climate change already being felt through sustainable design and construction techniques, urban greening, SuDS, maximising sustainable energy supply, decentralised and renewable energy networks, and improved flooding and waste management schemes.

10.2.7 In particular, the following policies that form part of Chapter 5 of the London Plan apply:

- Policy 5.1 Climate Change Mitigation: The Mayor seeks to achieve an overall reduction in London's carbon dioxide emissions of 60 per cent (below 1990 levels) by 2025. It is expected that the GLA Group, London boroughs and other organisations will contribute to meeting this strategic reduction target, and the GLA will monitor progress towards its achievement annually;
- Policy 5.2 Minimising Carbon Dioxide Emissions: Requires that development proposals make the fullest contribution to minimising carbon dioxide emissions in accordance with the following energy hierarchy: Be lean - use less energy; Be clean - supply energy efficiently; Be green - use renewable energy;
- Major development proposals are required to include a detailed energy assessment to demonstrate how targets (zero carbon for both domestic and non-domestic buildings by 2019) will be met;
- Policy 5.3 Sustainable Design and Construction: Development proposals are required to demonstrate that sustainable design standards are integrated, for construction and operation, and ensure that they are considered at the beginning of the design process;

[5] DCLG, 2012; National Planning Policy Framework
[6] DCLG, 2015; National Planning Practice Guidance and DCLG,
[7] GLA, 2016; The London Plan – The Spatial Development Strategy for London Consolidated with Alterations Since 2011

- Policy 5.5 Decentralised Energy Networks: The Mayor expects 25 per cent of the heat and power used in London to be generated through the use of localised decentralised energy systems by 2025;
- Policy 5.6 Decentralised Energy in Development Proposals: Development proposals should evaluate the feasibility of Combined Heat and Power (CHP) systems, and where a new CHP system is appropriate also examine opportunities to extend the system beyond the site boundary to adjacent sites;
- Policy 5.7 Renewable Energy: Development proposals should seek to utilise renewable energy technologies such as: biomass heating; cooling and electricity; renewable energy from waste; photovoltaics; solar water heating; wind and heat pumps;
- Policy 5.9 Overheating and Cooling: Development proposals should maximise opportunities to orientate buildings and streets to minimise summer and maximise winter solar gain; use trees and other shading; increase green areas in the envelope of a building; maximise natural ventilation; expand green networks across London and wherever possible incorporate a range of public and/or private outdoor green spaces; and
- Policy 5.13 Sustainable Drainage: Developments should utilise sustainable urban drainage systems (SUDS).

The London Plan – The Spatial Development Strategy for Greater London: Intend to Publish Version to Secretary of State (December 2019)[8]

10.2.8 The Draft London Plan (last update December 2019) - identifies climate change as a major global problem and states that a responsible city must limit its impact on climate change, while also adapting the plan to the consequential changes in climate already being experienced. The Plan also requires developments to contribute towards London's ambitious target to become zero carbon by 2050 by increasing energy efficiency, including through the use of smart technologies, and utilising low carbon energy sources. Other objectives include effective water and flood risk management, sustainable construction techniques and implementation of green infrastructure.

A Green Future: Our 25 Year Plan to Improve the Environment[9]

10.2.9 A Green Future: Our 25 Year Plan to Improve the Environment (2018, last update 2019) sets out the actions the UK Government will take to help the natural world regain and retain good health. The goals include clean air, minimising waste and mitigation against climate change.

10.2.10 One of the targets under this policy is to mitigate and adapt to climate change. This is expected to be achieved by[10]:

- Continuing to cut GHG emissions including from land use, land use change, the agriculture and waste sectors and the use of fluorinated gases,
- Making sure that all policies, programmes and investment decisions take into account the possible extent of climate change this century; and,
- Implementing a sustainable and effective second National Adaptation Programme.

London Environment Strategy[11]

[8] GLA, 2019; The London Plan – Spatial Development Strategy for Greater London – Intend to Publish Version to Secretary of State. December 2019
[6] HM Government, 2018; A Green Future: Our 25 Year Plan to Improve the Environment.
[10] Defra, 2019: Policy Paper: Summary of targets in our 25 year environmental plan

[11] Mayor of London, 2018; London Environment Strategy

10.2.11 The Mayor's London Environment Strategy was published 31 May 2018 and sets out the Mayor's vision of London's environment to 2050. The London Environment Strategy includes a number of policies, aspirations, and guidance; however, it does not alter the methodology applied, or assessment of environmental effects undertaken within this ES chapter.

10.2.12 The London Environment Strategy outlines 7 themes to address environmental issues throughout London affecting Londoners. Two of these themes relate specifically to climate change:

- Chapter 6: Climate change mitigation and strategy – Reiterates the aim for London to be a zero-carbon city by 2050, with energy efficient buildings, clean transport and clean energy. This area focuses on reducing carbon emissions in London's highest emitting areas: transport and buildings; and
- Chapter 8: Adapting to climate change – Outlines the aim for London and Londoners to be resilient to severe weather and longer-term climate change impacts (including flooding, heat risk and drought). Climate change will increase the existing pressures on Londoner's wellbeing and prosperity through housing, infrastructure, services and the environment. This area focuses on improving resiliency of infrastructure, utility networks to help mitigate these impacts.

Local Planning Policy

10.2.13 The local planning policy documents that have been taken into consideration throughout preparation of this ES include the list below.

London Borough of Barnet (LBB) Local Plan

10.2.14 LBB's Local Plan – Core Strategy Development Plan Document (DPD)[12] (2012) specifies that one of the key priorities for LLB's future is to reduce the borough's carbon footprint where possible, particularly in new developments. The Core Strategy aims to influence future development in the borough to make the fullest contribution to the mitigation of, and adaptation to, climate change. Brent Cross/ Cricklewood is identified as high priority area given the scale of regeneration taking place.

10.2.15 LBB's Development Management Policies DPD[13] - Policy DM04 outlines Environmental Considerations for Development and requires that all major developments within the borough demonstrate, through an Energy Statement, compliance with the Mayor's targets for reductions in carbon dioxide emissions within the framework of the Mayor's energy hierarchy. The policy states that where possible, Decentralised Energy (DE) should be prioritised. Furthermore, developments should demonstrate compliance with the London Plan's water hierarchy for run-off and flood risk assessments will be expected on all applicable sites. Sustainable Urban Drainage techniques such as porous paving should be used where possible to reduce flood risk.

10.2.16 Mill Hill Area Action Plan's (AAP)[14] Policy MHE14 on Creating Sustainable Development aims for residential development to be Level 6 as set out in the Code for Sustainable Homes and to be zero-carbon by 2014. It also provides further details on measures to be incorporated that improve its sustainable performance. These will be considered in the Climate Change Resilience Statement.

10.2.17 Colindale AAP[15] outlines five policies that have a bearing on climate change. These include:

- Policy 6.1 Energy Hierarchy;
- Policy 6.2 CHP and District Heating System;
- Policy 6.3 Creating Sustainable Buildings;
- Policy 6.4 Flood Risk; and

[12] London Borough of Barnet (LBB), 2012; Local Plan (Core Strategy
[13] LBB, 2012; Development Management Policies DPD
[14] LBB, 2009; Mill Hill Area Action Plan (AAP)
[15] LBB, 2010, Colindale AAP

- Policy 6.5 Surface Water Runoff.

London Borough of Barnet Draft Local Plan (Reg 18) Preferred Approach Consultation (2020)

10.2.18 The LBB are currently in the process of reviewing and updating the borough's adopted Local Plan documents, and recently published its Draft Local Plan[16] (Regulation 18 document) for public consultation. The consultation period took place between 27 January – 16 March 2020, with the Regulation 19 (i.e. Publication of Local Plan for making representations on soundness issues (NPPF para 35) document scheduled for publication in Winter 2021. Adoption of the revised Draft/New Local Plan is not expected until Spring 2022.

10.2.19 The draft plan describes requirements for proposed developments necessary for delivery of the Mayor of London's target for London to be a net zero-carbon city by 2050. These include, for major developments (10 or more residential units) following the energy hierarchy (London Plan Policy 5.2), having a net zero carbon target, and provision of electric vehicle charging points. Policy ECC01 on Mitigating Climate Change describes how the council plans to minimize Barnet's contribution to climate change, focusing on energy efficiency, and requiring that proposed developments demonstrate how sustainable design and construction is incorporated, to enable mitigation of and adaptation to climate change, over the intended lifetime of the development.

10.2.20 By virtue of being at an early stage in the adoption process, the Draft Local Plan is considered to be of limited weight and is not a material consideration within this EIA.

Cricklewood, Brent Cross and West Hendon Regeneration Area Development Framework[17]

10.2.21 The LBB and the GLA identified the Cricklewood, Brent Cross and West Hendon area as a major opportunity for regeneration, of which the Site is situated within the southern aspect. The framework's Supplementary Planning Guidance stipulates that all buildings will be required to incorporate a range of best practice energy saving and environmental features, with specific mention of the following design issues: orientation and use of solar layout for housing; orientation and design to increase daylight provision in offices; south facing roof orientation to maximise solar gain; natural ventilation; BREEAM rating of 'very good' as a minimum; pressurisation testing on new building types to limit heat loss; combined Heat and Power systems. Proposals for development will need to show how sustainability principles will be met in terms of demolition, construction and long-term management. Furthermore, all properties and especially those with front doors directly on to the street must be capable of accommodating provision for the storage and sorting of recyclables by residents and suitable access for collection by vehicles, including domestic refuse.

Other Relevant Policy, Standards and guidance

Additional Policy/Standards/Guidance

10.2.22 The Greenhouse Gas Protocol[18], A Corporate Accounting and Reporting Standard, published by the World Resources Institute and World Business Council for Sustainable Development (WRI & WBCSD) provides standards and guidance for companies and other types of organisations in preparing a GHG inventory. The protocol provided overarching principles regarding methodology for the calculation of GHG emissions from activity data.

10.2.23 Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance,[19] provides guidance on addressing GHG emissions assessment and mitigation in EIA. Specifically, this guidance has informed: determination of current and future baselines, setting scope and boundaries, use of emissions factors and calculations methods, and determining significance.

[16] LBB, 2020; Draft Local Plan for Public Consultation – Regulation 18 Document
[17] LBB, 2005; Cricklewood, Brent Cross and West Hendon Regeneration Area Development Framework Supplementary Planning Guidance
[18] WRI & WBCSD, 2004; The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard.
[19] IEMA and Arup, 2017; Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance,

10.2.24 IEMA Principles on Climate Change Mitigation and EIA[20] sets out the over-arching principles relating to the consideration of climate change mitigation in EIA. It has informed the selection of life cycle stages for GHG calculations.

10.2.25 The Department of Environment, Food and Rural Affairs (Defra) and the Department of Business, Energy and Industrial Strategy (DBEIS)[21] annually publish the UK Government GHG Conversion Factors for Company Reporting. These conversion factors were used in the quantification of GHG emissions to convert the activity data into GHG emissions.

10.2.26 The UK Climate Projections (UKCP18)[22] is the leading source of climate information for the UK and its regions. The CCR review uses the observed climate data and climate change projections from the UKCP09 to consider future potential impacts on the Proposed Development.

10.3 Assessment Methodology

10.3.1 This section of this ES chapter presents the following:

- Information sources that have been consulted throughout the preparation of this chapter;
- Details of consultation undertaken with respect to Climate Change;
- The methodology behind the assessment of Climate Change effects, including the criteria for the determination of sensitivity of receptor and magnitude of change from the existing of 'baseline' condition;
- An explanation as to how the identification and assessment of potential Climate Change effects has been reached; and
- The significance criteria and terminology for the assessment of Climate Change residual effects.

10.3.2 The following sources of information have been reviewed and form the basis of the assessment of likely significant effects on Climate Change:

- B&Q Cricklewood EIA Scoping Report (December 2019);
- Cricklewood Lane Outline Energy Assessment (Issue P2 – 08 November 2019);
- ES Volume I: Chapter 6: Demolition & Construction;
- AECOM (2019) Preliminary Ecological Appraisal;
- EPR Architects (2020) Approximate Area Schedule;
- Entran (2020) Transport Assessment; and
- Montreux Limited (2020) The Feasibility Cost Plan Nr1 for Montreux Limited Cricklewood Lane, NW2 1 ES.

10.3.3 The scope of the GHG impact assessment covers the following sources of GHG emissions arising from the lifecycle stages defined below, undertaken within the red line boundary of the Proposed Development:

- Pre-construction stage (e.g. enabling works);
- Product stage (e.g. raw material extraction and manufacturing of products required to build the Proposed Development);

[20] IEMA, 2010; IEMA Principles Series: Climate Change Mitigation & EIA
[21] Department for Environment, Food and Rural Affairs (Defra) the Department of Business, Energy & Industrial Strategy's (DBEIS), 2020: UK Government GHG Conversion Factors for Company Reporting
[22] UK Met Office, 2018; UK Climate Projections 2018 (UKCP18).

- Construction process stage (e.g. on-site construction activity; transport of construction materials; worker commuting; disposal of waste generated during the construction process)
- Use stage (e.g. emissions from energy consumption and vehicle use associated with the Proposed Development)

10.3.4 The following elements within these life cycle stages were scoped out:

- Land use change: Emissions from loss of carbon stock will be minimal as the existing site consisting of hardstanding is low in carbon stock;
- Operational maintenance: Emissions from maintenance are likely to be minimal in proportion to the overall footprint; and
- Decommissioning: It is anticipated that the Proposed Development will be in use beyond the design life of the building. Any future decommissioning would require a separate EIA.

10.3.5 In line with the WRI & WBCSD GHG Protocol, the assessment reports GHG emissions in tonnes of carbon dioxide equivalent (tCO_2e) and includes the seven Kyoto Protocol gases:

- Carbon dioxide (CO_2);
- Methane (CH_4);
- Nitrous oxide (N_2O);
- Sulphur hexafluoride (SF_6);
- Hydrofluorocarbons (HFCs);
- Perflourocarbons (PFCs); and
- Nitrogen trifluoride (NF_3).

10.3.6 The baseline for the GHG emissions assessment is a business-as-usual scenario whereby the Proposed Development does not go ahead.

10.3.7 Emissions from land clearance were excluded from this assessment as the emissions from loss of carbon stock would be minimal because the existing Site consists of hardstanding and minimal low carbon vegetation.

10.3.8 The GHG assessment includes the calculation of GHG emissions from across the lifecycle of the project i.e. from construction activities and materials and operation/use of the Proposed Development. It has been used to identify GHG 'hot spots' i.e. sources and activities likely to contribute the largest amount of GHG emissions. This has enabled the identification of priority areas for mitigation. This approach is consistent with the principles set out in IEMA guidance[23].

10.3.9 Where activity data has allowed, expected GHG emissions arising from the construction activities and embodied carbon in materials of the Proposed Development have been quantified using a calculation-based methodology as per the following equation as stated in the DEFRA 2020 emissions factors guidance (Ref. 7.15) and aligned with the GHG Protocol[24]:

Activity data x GHG emissions factor = GHG emissions value

10.3.10 The emission factors used are selected from the following sources:

[23] IEMA, 2017: Assessing Greenhouse Gas Emissions and Evaluating their Significance
[24] WRI & WBCSD, 2004: The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard

- The Department for Environment, Food and Rural Affairs (Defra) the Department of Business, Energy & Industrial Strategy's (DBEIS) UK Government GHG Conversion Factors for Company Reporting[25];
- CIBSE TM46: Energy Benchmarks[26]; and
- RICS Guidance Note: Methodology to Calculate embodied carbon[27].

10.3.11 Key activity data used to calculate emissions includes:

- Transport of construction materials to the construction site;
- Transport of waste from the construction site;
- Construction waste disposal;
- Transport of construction workers predicted and an assumed daily travel commute distance;
- Fuel used by the plant and machinery predicted for the construction activities;
- Embodied carbon calculated from floor area benchmarks;
- Baseline and projected traffic information based on parking predicted traffic generation; and
- Energy consumption during operation of Proposed Development.

Significance Criteria

10.3.12 The significance of the estimated GHG emissions have been assessed in terms of the criteria of (a) sensitivity of the receptor and (b) magnitude of the emissions.

10.3.13 The global climate has been identified as the receptor for the purposes of the GHG emissions impact assessment. However, to enable significance evaluation of the estimated GHG emissions arising from the Proposed Development, the UK GHG inventory and the corresponding 5-year UK carbon budget were used as a proxy for the global climate.

10.3.14 There is no published standard definition for receptor sensitivity to GHG emissions set out in the IEMA guidance or elsewhere. The sensitivity of the receptor, the UK carbon budget (as a proxy for the global climate), has been defined as high. The rationale for this approach is as follows:

- Any additional GHG impacts could compromise the UK's ability to reduce its GHG emissions and therefore meet its future carbon budgets; and
- The extreme importance of limiting global warming to below 2°C this century, as broadly asserted by the International Paris Agreement[28] and the climate science community

10.3.15 Due to the absence of any defined industry guidance for assessing the magnitude of GHG impacts for EIA, standard GHG accounting and reporting principles have been followed to assess impact magnitude. In GHG accounting, it is common practice to consider exclusion of emission sources that are <1% of a given emissions inventory on the basis of a 'de minimis' contribution. Both Department of Energy and Climate Change (DECC)[29] and Carbon Trust[30] allow emission sources of <1% contribution to be excluded from emission inventories, and these inventories to still be considered complete for verification purposes.

10.3.16 This would therefore suggest emissions of less than 1% of the UK inventory and relevant annualised carbon budget could be considered to have a minimal contribution to the wider national GHG emissions.

[25] Department for Environment, Food and Rural Affairs (Defra) the Department of Business, Energy & Industrial Strategy's (DBEIS), 2020: UK Government GHG Conversion Factors for Company Reporting
[26] Chartered Institute of Building Services Engineers, 2008: TM46: Energy Benchmarks
[27] Royal Institution of Chartered Surveyors (RICS), 2014: Guidance Note: Methodology to Calculate embodied carbon, 1st edition
[28] Paris Agreement, https://ec.europa.eu/clima/policies/international/negotiations/paris_en
[29] DEFRA/DECC, 2009; Guidance on how to measure and report your greenhouse gas emissions
[30] Carbon Trust, 2018; Guide to carbon footprinting

This approach has been used to assess the magnitude of the GHG emissions from the Proposed Development and the associated criteria are outlined in Table 10-1.

Table 10-1: Description of magnitude criteria for GHG emissions assessment

Magnitude of change	Criteria description
High	Estimated GHG emissions equate to more than 1% of total emissions across the 5-year UK Carbon Budget period in which they arise.
Low	Estimated GHG emissions equate to less than 1% of total emissions across the 5-year UK Carbon Budget period in which they arise.

10.3.17 The UK carbon budgets[31] are in place to restrict the amount of GHG emissions the UK can legally emit in a defined five-year period. In assessing the significance of future GHG emissions it is important to consider how they could affect the UK's ability to meet its carbon budget. The significance criteria therefore reference the appropriate budget period. The UK is currently in the 3rd carbon budget period, which runs from 2018 to 2022.

10.3.18 The overall construction programme for the Proposed Development (January 2021 – July 2026) falls within the 3rd and 4th carbon budgets.

10.3.19 The operational phase of the Proposed Development (fully operational and occupied by 2026) has been compared to the appropriate and available carbon budgets within the design life of the development. To date the UK has agreed up to the 5th carbon budget period which runs from 2028 to 2032.

10.3.20 Table 10-2 shows the current and future UK carbon budgets up to 2032, highlighting a reduction in the amount of greenhouse gas the UK can legally emit going into the future. Any source of emissions contributing to the UK's carbon inventory will have a more significant impact on the UK carbon budgets in the future.

[31] Department for Business, Energy and Industrial Strategy, UK Carbon Budgets https://www.gov.uk/guidance/carbon-budgets

Table 10-2: Relevant carbon budgets for the GHG emissions assessment

Carbon budget	Total budget (MtCO2e)
3rd (2018 – 2022)	2,544
4th (2023 – 2027)	1,950
5th (2028 – 2032)	1,725

10.3.21 The significance of effects arising from GHG emissions has been determined using the matrix in Table 10-3. This differs from the criteria presented in *Chapter 7: EIA Methodology* by omitting the 'Very Low', 'Low' and 'Medium' categories for sensitivity and omitting the 'Very Low' and 'Medium' categories for magnitude.

10.3.22 This is because the sensitivity of the receptor (global climate) to increases in GHG emissions is always high, and the magnitude of the impact is determined by a threshold of less than or more than 1% of the relevant UK 5-year carbon budgets. This is in line with the IEMA guidance[32] which states that the application of the standard EIA significance criteria is not considered to be appropriate for climate change mitigation assessments.

10.3.23 A GHG emissions impact of greater than 1% of the relevant 5-year UK carbon budget would be considered significant and be rated 'Major' in accordance with Table 10-3.

Table 10-3: Classification of effects

		Sensitivity
		High
Magnitude	Low	Minor Adverse
	High	Major Adverse

Consultation

10.3.24 Consultation on the scope of the climate change assessments was undertaken through the EIA Scoping Report dated December 2019 and LBB EIA Scoping Opinion (dated February 2020). In the Scoping Opinion the local planning authority confirmed that the proposed scope of the Climate Change Assessment as described in the Scoping Report was acceptable and no comments pertaining to modification of scope or methodology were raised.

Limitations and Assumptions

10.3.25 The assumptions made in this assessment are described in the table below.

[32] IEMA, 2017: Assessing Greenhouse Gas Emissions and Evaluating their Significance

Table 10-4: Assumptions

Lifecycle stage	Activity	Primary Emission Sources	Assumptions
Baseline	Baseline traffic	GHG emissions from transport	Assumed 30km average distance per trip associated with baseline Site traffic. Assumed most appropriate category for HDVs to be "Rigid HGV, 7.5-17t, 50% laden" based on DEFRA emission factor categories.[33]
	Baseline energy use in buildings	GHG emissions from electricity and gas consumption in existing buildings	Assumed CIBSE[34] category of "Large non-food shop" to be appropriate to benchmark baseline emissions.
Product	Embodied carbon in construction materials	GHG emissions associated with extraction and use of construction materials	Used RICS benchmarks[35] and applied these to areas (m^2) defined in the Cricklewood Lane Maximum Parameter Area Schedule[36] to calculate emissions, and made the following assumptions: Community (D1) area most appropriate RICS category: "Libraries and Community Centres" (485 kg CO_2e/m^2) Commercial (A3/B1/D2) area most appropriate RICS category: "Mixed use city Development Parcel (Ground floor commercial offices, leisure)" (840 kg CO_2e/m^2) Residential area most appropriate RICS category: "Residential medium rise (11-15 storeys)". (970 kg CO_2e/m^2). While number of proposed storeys varies per Development Parcel, this category was selected as a representative median based on the Detailed Unit Distribution Matrix[37]. Other non-residential area most appropriate RICS category: "Depot/open storage" (410 kg CO_2e/m^2)
Demolition and Construction	Staff travel to Site	GHG emissions from transport	Assumed most staff will commute via public transport, especially London Underground, and assuming an average round trip of 15km per day.
Demolition and Construction	HGV and LGV Movements	GHG emissions from HGVs and LGVs associated with construction and demolition	Assumed an average distance of 50km each way per construction vehicle trip. Assumed all delivery vehicles will leave empty and all collection vehicles will arrive empty. Have assumed no consolidation of trips to be conservative.

[33] Department for Environment, Food and Rural Affairs (Defra) the Department of Business, Energy & Industrial Strategy's (DBEIS), 2020: UK Government GHG Conversion Factors for Company Reporting
[34] The Chartered Institute of Building Services and Engineers, 2008: CIBSE TM46 Energy Benchmarks
[35] Royal Institution of Chartered Surveyors (RICS), 2014: Methodology to Calculate Embodied Carbon
[36] EPR Architects, 2020: 10965 Cricklewood Lane – Approx. Area Schedule Rev 06(1)
[37] EPR Architects, 2012; Cricklewood Lane Detailed Unit Distribution Matric Rev 12 (17/01/2020)

Lifecycle stage	Activity	Primary Emission Sources	Assumptions
			Based emission factors on average HGV and average vans emissions, as described by DEFRA[38].
Demolition and Construction	Waste generation	GHG emissions from waste recycling and/or disposal	Based on information in *Chapter 6: Demolition and Construction*, assumed the following: 100% of the following waste types will be recycled: metals, plasterboard, timber. 50% of the following waste types will be recycled, and 50% sent to landfill: concrete, bricks, electrical waste, packaging, insulation and plastics. 100% of the following waste types will be sent to landfill: general waste, plaster/cement and miscellaneous.
Demolition and Construction	Energy consumption	GHG emissions from plant and machinery	An energy usage benchmark[39] has been used to quantify this, based on average energy consumption data standardised to the construction value. This is on the assumption that the plant and equipment used in the construction of the Proposed Development will not be more or less energy intensive than an average UK construction project.
Operation	Operational traffic	GHG emissions from traffic	Assumed daily trips associated with the operational phase of the Proposed Development to be 30km.

10.4 Baseline Conditions

10.4.1 The baseline conditions used for the GHG emissions assessment comprise a business-as-usual scenario whereby the Proposed Development does not go ahead.

10.4.2 The Site is currently occupied by a range of retail outlets, including a B&Q DIY Store, Pound Stretcher and Tile Depot in the south-western aspect of the Site. The northern and eastern aspects of the Site mainly consist of car parking associated with the aforementioned retail outlets, as well as soft landscaping adjacent to the railway lines.

10.4.3 The GHG emission sources for the baseline assessment reflect the existing activities and Site conditions. These include energy consumption for retail outlets (electricity and fuel); and traffic (vehicle journeys).

10.4.4 Current and Future baseline GHG emissions have been calculated as follows:

[38] Department for Environment, Food and Rural Affairs (Defra) the Department of Business, Energy & Industrial Strategy's (DBEIS), 2020: UK Government GHG Conversion Factors for Company Reporting
[39] The benchmark of GHG emissions per £100k project value was obtained from the Construction Excellence and Gleningan, 2018: UK Industry Performance Reporting

Table 10-5: Current and Future Baseline Emissions

	Emissions Source	tCO_2e per year
Current Baseline	Energy use in buildings	607
	Vehicle journeys	11,483
Future (2026) baseline	Energy use in buildings	607
	Vehicle journeys	11,957

10.4.5 Electricity grid intensity is expected to decrease in the future due to an increase in the use of low carbon electricity generation technologies such as renewables. This has not been accounted for in the GHG assessment as using current emission factors for electricity gives a worst case/conservative estimate of both the future baseline and operational emission from the proposed development. As such, the future baseline and operational emissions have been estimated on the same basis, enabling meaningful comparisons to be made between the baseline and the proposed development.

10.5 Environmental Design and Management

10.5.1 As stated in the Fifth Assessment Report (AR5) - Synthesis Report published by the Intergovernmental Panel on Climate Change (IPCC) (2014)[40], climate change mitigation (that is reducing GHG emissions) and adaptation (that is responding to climate change impacts) are complementary approaches to reducing risks of climate change impacts over different timescales.

10.5.2 Mitigation, in the short-term and medium-term, can substantially reduce climate change impacts in the latter decades of the 21st century. Benefits from adaptation can be realised now to address current risks, and can be realised in the future to address emerging risks. Innovation and investments in environmentally sound infrastructure and technologies can both reduce GHG emissions and enhance resilience to climate change.

10.5.3 As described in *Chapter 6: Demolition and Construction*, GHG emissions during the construction and demolition phase will be reduced by:

- Processing arisings on site to increase recycling/re-use and limit HGV trips required to remove arising.
- Reducing waste in line the WRAP's Halving Waste to Landfill initiative by:
- Agreeing with material suppliers to reduce the amount of packaging or to participate in a packaging take-back scheme;
- Implementing a 'just-in-time' material delivery system to avoid materials being stockpiled, which increases the risk of their damage and disposal as waste;
- Using standard size components in design detailing to eliminate risk at source where possible to do so;
- Paying attention to material quantity requirements to avoid over-ordering and generation of waste materials;
- Re-using materials wherever feasible, e.g. re-use of excavated soil for landscaping (the Government has set broad targets of the use of reclaimed aggregate, and in keeping with best practice, contractors will be required to maximise the proportion of materials recycled);

[40] IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland.

- Segregating waste at source where practical;
- Re-using and recycling materials off-site where re-use on-site is not practical (e.g. through use of an off-site waste segregation facility and re-sale for direct re-use or re-processing);
- Colour coding and signposting skips to reduce risk of cross contamination and covered to prevent dust and debris blowing around the site, these will be cleared on a regular basis; and
- Not burning waste or unwanted materials on-site.
- Implementing a Construction Logistics Plan to streamline traffic requirements and therefore reduce HGV movements.

10.5.4 During operational phase, GHG emissions will be reduced by energy saving elements in building design, and by anticipated reduction in traffic associated with the development

10.5.5 The Outline Energy Assessment[41] details several energy saving design elements which will reduce GHG emissions from the operational phase of the Proposed Development. These elements include: improved fabric "U" values; improved air tightness; minimised cold bridging optimising of glazing; communal heating system; high efficiency ventilation systems; low energy lighting; smart meters, and air source heat pumps.

10.5.6 The Outline Energy Assessment further states that "*carbon dioxide emissions for the residential elements of the scheme will be off-set through a cash in lieu contribution (of £60/tCO_{2e} for a period of 30 years) to the local planning authority to be ring fenced to secure delivery of carbon dioxide savings elsewhere*"[42].

10.5.7 Emissions from vehicular traffic are projected to decrease during operational phase, due to the predicted reduction in traffic volumes resulting from the change in land use from primarily commercial to primarily residential.[43].

10.5.8 The Design Guidelines[44] provides considerations for design approaches to reduce GHG emissions, which include:

- Responsible sourcing of materials and specification of low impact/ high recycled content materials; and
- An energy efficient lighting proposal.

However, these Design Guidelines do not identify specific examples of design measures to reduce GHG emissions, only statements that consideration will be given to such measures.

[41] Meinhardt, 2019: Cricklewood Lane Outline Energy Assessment, Draft issue P1 – 28 October 2019
[42] Meinhardt, 2019: Cricklewood Lane Outline Energy Assessment, Draft issue P1 – 28 October 2019
[43] AECOM, 2019: B&Q Cricklewood EIA Scoping Report, page 21
[44] EPR Architects, 2020; Design Guidelines

10.6 Assessment of Effects and Significance

Effects during Demolition and Construction

10.6.1 The total GHG emissions from the demolition and construction of the Proposed Development are estimated to be in the order of 106,957 tCO_2e. The breakdown of the estimated GHG emissions are shown in the table below.

Table 10-6: GHG Emissions from Demolition and Construction Phase

Life cycle stage	GHG Emission Source	GHG Emissions (tCO_2e)	% of Total Demolition/ Construction Emissions
Product	Embodied carbon from materials	100,493	94%
Pre-construction and Construction	Vehicular emissions: Transportation of demolition and excavation waste from Site, and transport of construction materials to Site	3,306	3%
Pre-construction and Construction	Emissions from use of energy in plant and equipment	1,095	1%
Pre-construction and Construction	Emissions from disposal and recycling of waste from demolition and construction activities	1,709	2%
Pre-construction and Construction	Vehicular emissions from construction workers travel to and from Site.	354	0.3%
	Total	**106,957**	**100%***

*Rounded to closest percent

10.6.2 GHG emissions from construction activities will occur during the anticipated construction period of January 2021 – end June 2026 (5.5 years)

10.6.3 It is noted that the majority of GHG emissions associated with the construction of the Proposed Development are linked to embodied carbon in materials. Whilst the Design Guidelines for the Proposed Development require that consideration is given to sourcing materials with low carbon impact, the material specifications will be confirmed at the future Reserved Maters Planning Application (RMA) stage. Furthermore, the CEMP will set the requirement for the Principal Contractor to identify applicable measures for the reduction of energy and carbon emissions during the demolition and construction period.

Effects once Complete and Operational

10.6.4 The total GHG emissions from the Proposed Development once it is complete and operational are estimated to be in the order of 2,554 tCO_2e per annum. The GHG emission sources, broken down by use to indicate the GHG emissions from energy demand, are shown in the table below.

Table 10-7: Operational Phase GHG Emissions

GHG Emission Source	Annual GHG Emissions (tCO_2e)
Energy consumption in buildings	1,063
Vehicles trips	1,491
Total Annual	**2,554**
Current Annual Baseline Emissions	**12, 090**
Total Annual Residual (i.e. net emissions p.a.)	**-9,536**

10.6.5 Total GHG emissions arising over a typical occupied design life (60 years) of the Proposed Development are 153,240 tCO_2e. Once the Proposed Development is complete and operational, there will be GHG emissions arising from the provision of the water supply and treatment of wastewater, however these are not expected to be material in comparison to energy consumption.

10.6.6 Table 10-8 provides the context of the total GHG emissions from the Proposed Development by comparing it with the UK Carbon Budgets. The relevant carbon budgets for this assessment are the 3rd (2018 – 2022), 4th (2023 – 2027) and 5th (2028 – 2032). The UK carbon budgets have only been developed up to 2032.

Table 10-8: GHG Emissions in the Context of the UK carbon Budgets

	3rd Carbon Budget 2018 - 2022	4th Carbon Budget 2023 - 2027	5th Carbon Budget 2028- 2032
Demolition & construction GHG emissions (tCO2e)	38,839	68,063	0
Operational Phase GHG emissions (tCO2e)	0	3,831	12,770
Total emissions from Proposed Development (tCO2e)	38,893	71,894	12,770
% of Carbon Budget	**0.0015%**	**0.0037%**	**0.0007%**

10.6.7 The GHG emissions during the demolition and construction stage will mainly be associated with embodied carbon in materials. GHG emissions from the Proposed Development once it is complete and occupied will mainly be associated with the energy and heat demand of the building. However, GHG emissions from the construction and occupation of the Proposed Development account for less than 1% of the total emissions during the carbon budgets in which they occur therefore the magnitude of the GHG emissions impact is considered low.

10.6.8 The GHG emissions impact of the Proposed Development during both demolition and construction, and once the Proposed Development is complete and occupied, taking into account the receptor's sensitivity (global climate), is **minor adverse**.

10.7 Additional Mitigation and Monitoring Measures

10.7.1 As discussed in Section 10.5, a number of mitigation measures to reduce GHG emissions from the Proposed Development are to be confirmed at the RMA stage, including material specifications, design measures for energy efficiency and renewable energy provision within the Proposed Development. Principles for these design measures have been incorporated within the Design Guidelines of the Proposed Development and therefore no additional mitigation measures are considered to be required.

10.8 Residual Effects and Conclusions

10.8.1 The effects of the Proposed Development with regards to climate change are summarised in Table 10-9 below.

10.8.2 The GHG emissions during the demolition and construction stage will mainly be associated with embodied carbon in materials. While the Design Guidelines for the Proposed Development sets the key design principles for reducing embodied carbon, these are to be implemented at RMA stage. GHG emissions of the Proposed Development once it is complete and operational will mainly be associated with the energy and heat demand. The design of the Proposed Development includes energy efficiency measures and the provision of renewable energy (such as solar panels) are to be confirmed in future Reserved Matters applications.

Table 10-9: Climate Impact Assessment Summary of Potential Effects

Description of Effect	Sensitivity of Receptor	Nature of effect/Geographic Scale	Magnitude of Impact	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation	Residual Effect and Significance
Demolition and Construction						
GHG Emissions	High	Global	Low	Minor Adverse	No additional mitigation is proposed	**Minor Adverse (not significant)**
Complete and Occupied						
GHG Emissions	High	Global	Low	Minor Adverse	No additional mitigation is proposed	**Minor Adverse (not significant)**

10.9 Statement of Effect Significance

10.9.1 Within each of the UK carbon budgets, the GHG emissions of the Proposed Development do not account for more than 1% of any of the individual the five-year carbon budgets therefore the magnitude of the GHG emissions impact is considered to be low.

10.9.2 The significance of the GHG emissions impact of the Proposed Development taking into account the sensitivity of the receptor (the global climate) is **minor adverse**, and as such is considered to be 'not significant'.

10.10 Cumulative Effects Assessment

10.10.1 A cumulative effects assessment of GHG emissions has not been undertaken, as the predicted GHG emissions of cumulative schemes, as listed in *Chapter 7: EIA Methodology* are not known. Furthermore, the cumulative GHG emissions would not just be limited to the cumulative schemes listed in *Chapter 7: EIA Methodology*, as the receptor of the GHG emissions assessment is the global climate, with the UK National Carbon Budget used as a proxy. Therefore, any GHG emissions across the UK could be considered to have cumulative effects with the GHG emissions of the Proposed Development. Hence, a cumulative effects assessment for GHG emissions is not considered to be applicable.